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SCIENTISTS FIND ZINC DEFICIENCY IN SOIL

Dacca THE BANGLADESH TIMES in English 19 Nov 80 p 8

[Text] The deficiency of zinc which, though a micro-nutrient, is an important ingredient that partly acts as catalyst in soil fertility has been detected in large areas of Bangladesh.

The Government has immediately taken measures to rectify the deficiency as the intensive investigation continues, according to authoritative sources. [as published]

The problem of zinc deficiency in the soil was first detected in Barisal when scientists of Bangladesh Rice Research Institute started investigation into certain complaints by the farmers of the area last year.

Following the detection of the BRRI scientists began investigating in other areas as well. The investigation has already resulted in detection of zinc deficiency in certain areas of Barisal, Faridpur, Kushtia, Pabna, Jessore, Rajshahi, Dacca, Comilla, Mymensingh and Jamalpur districts.

A BRRI scientist told the TIMES that the zinc deficiency in these areas resulted because of intensive rice cropping in inundated condition and low organic matter content in the soil.

The scientist said that soil with zinc deficiency would be inert to any fertilizer treatment.

In order to deal with the problem, the Government has already arranged import of 15 thousand tons of zinc sulphate for demonstration and exploratory works. It has already reached Chittagong port, it is learnt.

Meanwhile, BRRI scientists are carrying out investigation in areas where intensive rice cropping in inundated condition is done.

CSO: 5000

BETTER CONTROL OF MONSOON EFFECTS URGED

Dacca THE BANGLADESH TIMES in English 16 Nov 80 p 7

[Editorial]

[Text] The effects of pollution on life and environment in a hot, humid and rain-fed country like Bangladesh can be severe. True, the 'sophisticated' fallout contaminations are yet out of our way and the atmosphere here is not extremely pallid or suffocating with back-water industrial discharges in the cities or the spewing out gases from the chimneys. But our worry lies in the sticky monsoon humidity which has harbouring and germinating potentials above the surface and along it as well.

From this standpoint, the work of the appropriately named Monsoon Region Environment Society (MONRES) is well worth watching. It has obviously a long way to go and a going thing it seems to be with a regional approach to obviate the incapacity of any individual monsoon-region country, resource poor as it is, to fight pollution singlehanded. The bacteria migrations have also been kept in view. The MONRES meeting at the Atomic Energy Commission has recommended an integrated strategy to control pollution. We take it that integration implies a comprehensive tackling of contaminating circumstances in a given environment. Thus defined, the approach calls for the evolution of a low-cost yet a sufficiently equipped technology to acquire a certain substance.

Industrial effluents and the backlashes of pesticide uses in agriculture have been subjects of customary debates for cogent reasons, but attention tends to fade on the questions of civic failings and the disposal system relating to biological and other putrid forms of waste. The gaping manholes of the underground sewers give out-lets for the toxic gases to slow-poison the environment already none-too-clean for other pollutants. The left-overs and animal carcasses on the lanes and by-lanes are spots so evidently vulnerable to the growth of bacteria.

Then there are the countryside menaces to be contained. The health, hygiene and pollution authorities must combinedly face the higher incidence of gastroenteritis leading cholera cases and the evidence of the return of malaria. Severe intestinal diseases which broke out in the northern zone have now reportedly spread to Chandpur. The hurtful Anopheles is said to have regenerated with immunity against the widely-used malarial antidotes.

The pure water supplies and the sanitary conditions in the villages cannot improve significantly without massive international and national involvements. But simultaneously, community participation is worth a try here for it would just be the other name for pollution and health awareness.

CSO: 5000

HEAD OF ENVIRONMENT DEPARTMENT INTERVIEWED

New Delhi PATRIOT in English 20 Nov 80 pp 1, 7

[Text] New industries and development projects like dams, power stations and mines, will in future have to seek 'ecological clearance'.

'They will have to submit detailed reports on what is their raw material, what will be the output and the effluents and what likely effect it could have on the environment and ecology of the site', Prof M G K Menon, who is in charge of the newly created Department of Environment (DOE) said in an interview.

These reports will become as vital as the technical feasibility reports and statements on finances, import components and other documents now necessary for procuring Government sanction for new developmental projects.

According to current proposals, the promoters of prospective projects will have to sponsor the necessary surveys and research on their own without laboratories and environment consultants, which in turn will give a fillip to the establishment of a proper infrastructure for the sciences of ecology and conservation, Prof Menon said. That, he said, was important, for when large units like dams or thermal plants were set up, the issue was not just the pollutants and effluents, but changes brought about in the water table, the land salinity and even in the flora and fauna of the region.

Prof Menon said the department's expansion was being worked out. It had been created by incorporating the environment division of the Department of Science and Technology--also needed by Prof Menon--following the recommendations of the Experts group created by Prime Minister Indira Gandhi earlier this year under the chairmanship of Planning Minister N D Tiwari.

In due course, the proposals are not only to expand the department itself, but also to create environment cells in each Ministry and Government department so that for new projects and schemes, an internal system of supervision and monitoring was available. These cells, which would be in close liaison with the DOE, would then be able to better coordinate the environment and ecology protection programmes which were being given top priority by the Government, Prof Menon said.

As the department is consolidated, there have been proposals that existing organisations like the Central Board for Control of Water Pollution, the Lands Commission and zoological and botanical units also become part of the DOE to ensure

coordination in all aspects of environment protection and maintenance of ecological balance.

A major activity of the department will be to encourage research in ecology at all levels, and to make environment and ecology, a regular subject of study at the school and college levels. In the next budget, the DOE will be given a budget of its own. The DOE will sponsor research in chosen institutions and will also develop selected centres for advanced research in the developing field of environment.

Legislation

The DOE will also study appropriate legislation to ensure that the country's natural resources are conserved and are not pillaged and will also support the development of 'biospheres' where the fine balance between the atmosphere, the terrain and its flora and fauna is preserved in its pristine form, or as close to it as possible, Prof Menon said.

However, Prof Menon said, department, legislative and governmental effort in this direction would not be effective and sufficient unless the concern for preservation of the environment percolated to the grass roots level and became a social movement.

Towards this goal, the department will cooperate with the National Council of Educational Research and Training to formulate curricula and textbooks for the subject. It will also cooperate with the state educational boards so that environmental studies eventually become an important part of the curricula and also develop as a regular subject of specialisation. At present, he said, there was no specialisation in the subject at the university level.

Prof Menon did not envisage any early creation of a monitoring and control force on the lines of the Forest Service for environment as to required large scale involvement of finances and personnel. However, the department was banking on a voluntary policing done by organisations and individuals throughout the country.

Such organisations and also individuals, he said, are invited to inform the department of any activity or industry in their area which is detrimental to the environment or life-forms in the region.

The N D Tiwari Committee in its recommendations has said the DOE, which should be under the charge of the Prime Minister assisted later by a Minister, should play a watchdog role and bring to the attention of Government and Parliament instances and consequences of environmental degradation. The DOE, a nodal agency, should also have direct administrative responsibility for pollution monitoring and regulation and conservation of marine systems and 'critical eco-systems' designated as 'biosphere reserves'. [as published]

The DOE, the report says, should also have its own monitoring, intelligence and early warning systems apart from a legal wing.

BRIEFS

RURAL DRINKING WATER--New Delhi, November 10 (PTI): Mr. Bhishma Narain Singh, minister for works and housing and parliamentary affairs, has pledged the country's full support to the aims of the international decade for drinking water supply and sanitation (1981-90). In a radio broadcast today, the minister said that in India a beginning had already been made by according high priority to rural drinking water supply in the sixth five-year plan. The government had resolved to provide safe drinking water to villages within five years. The government hoped to ensure that no rural family would have to walk more than 1.6 km to a public tap. Villages, which had no protected sources within a reasonable distance of where water carried cholera or guinea worm or contained toxic elements which were hazardous to health, had been termed "problem villages" and the government had resolved to provide safe drinking water to these villages within five years. "We propose to tackle the problem of rural sanitation on a large scale in the coming years and would strive to provide a larger coverage to our rural population in the coming decade mainly through the popularisation of low-cost sanitary latrines," Mr. Singh said. [Text] [Bombay THE TIMES OF INDIA in English 11 Nov 80 p 7]

CSO: 5000

SCIENTISTS CALL FOR PROTECTING TROPICAL, SUB-TROPICAL AREAS

OW281306 Beijing XINHUA in English 1227 GMT 28 Nov 80

[Text] Changsha, 28 Nov (XINHUA)--Chinese scientists have appealed for better protection and more rational exploitation of the natural resources in China's tropical and sub-tropical areas under unified government planning.

In the opinion of the participants at a national science symposium held earlier this month in Zhuzhou, Hunan Province, Central South China, a special commission should be set up to plan and supervise the use of the natural resources throughout China, particularly those in the tropical and sub-tropical areas of South and Southwest China.

In all, China's tropical and sub-tropical areas total two million square kilometers, or 21 percent of China's land territory. Around 60 percent of the national grain output and 40 percent of that of cotton are produced in these areas, where half of China's 1,000 million people live.

The scientists asked the government to stop wanton land reclamation which ruins forests and grasslands, and to improve protection of wild plants and animals, many of which are of great scientific or economic value.

There are over 1,400 species and sub-species of seed plants in the tropical and sub-tropical areas, accounting for about 50 percent of China's total. The areas also harbor some 1,500 kinds of wild life.

It also is necessary, said the scientists, to launch a public education program on ecology and environmental protection.

The national symposium, called to discuss development and ecological balance in the tropical and sub-tropical areas in particular, is the first such meeting in China since the founding of the People's Republic in 1949.

It highlighted the current national discussion on planning regional development in accordance with local conditions by breaking away from the past policy of putting one-sided emphasis on grain production.

Under that policy, potential for a diversified economy in tropical and sub-tropical areas, especially in their mountainous and hilly regions, was ignored while people were forced to increase grain output at any cost.

The scientists called attention to the serious ecological imbalances in tropical and sub-tropical areas which cover the whole of Yunnan, Guizhou, Sichuan, Taiwan, Guangdong, Hunan, Hubei, Fujian, Zhejiang provinces, the Guangxi Zhuang autonomous region and the Shanghai Municipality, and part of Anhui and Jiangxi provinces as well as Tibet.

LEGISLATION ON CHEMICAL SUBSTANCES, PROTECTION OF ENVIRONMENT REVIEWED

Bucharest REVISTA ROMANA DE DREPT in Romanian Oct 80 pp 3-9

[Article by Dr Dunitra Popescu, based on a talk given by the author at an international meeting held in Giessen (FRG), in September 1979]

1. General Considerations

During the past 10 years, environmental problems have acquired a growing importance in our country's theoretical and practical activities, environmental protection being considered as an important part of the general planned activity for the country's socioeconomic development, in keeping with the fundamental principles of our party and state policy for the building of the multilaterally developed socialist society.

In his Report to the 11th Party Congress, the secretary general of the party, Nicolae Ceausescu, indicated that greater attention will have to be devoted to pollution prevention measures, and to the conservation of the unaltered environment, thereby providing the population with the best possible living conditions both now and in the future. In this respect, the vast program for the country's socioeconomic development, adopted by the 10th and 11th Congresses of the RCP, provide in their environment sections a number of economic, technical, legislative, organizational, scientific research, and educational measures, whose implementation will maintain and improve the environment's quality, consistent with the protection of nature and the harmonious pursuit of human affairs. Moreover, the documents adopted by the 12th Party Congress raise environmental problems to a still higher level, in accordance with the new demands for our country's socioeconomic development.

In the report presented to the 12th Congress, the secretary general referred to the need for a continued fulfillment of the provisions contained in the national program for conserving and developing the forestry fund, and for reducing the pollution and maintaining the quality of water, as an essential factor for ecologic balance, and stated that "we will have to rigorously apply the provisions of the Law on Environmental Protection, assuring the equilibrium of nature and a suitable environment for our people's lives, now and in the future". (1)

Based on the National Development Program, the policy for environmental protection includes among other things: the rational use of natural resources, the adoption of non-polluting technologies, the use of pollution control installations, the utilization of useful substances found in wastes, the instruction and education of the population about environmental problems, and the expansion of international cooperation actions for environmental protection.

At present, according to the Program-Directive for Scientific Research and Technical Development, the chemical industry has special responsibilities in the environmental area for developing new environmental protection technologies, producing chemical fertilizers with greater efficiency on plants, and conducting biologic studies whose results will be applied to the environment.

General Legal Framework

In legislative terms, the adopted legal regulations and measures have created an appropriate legal and institutional framework for implementing environmental protection measures while establishing functions and responsibilities in this domain.

The legal problems of the environment have been regulated for all environmental factors in Law No 9/1973, regarding the protection of the environment.

In addition to this general law, special regulatory acts have been adopted for the protection of some environmental factors, the major of these acts being: Law No 8/1974 for water; Law No 1/1976 for adopting the long-term national program for outfitting hydrographic basins; Order of the Minister of Health No 623/1973, referring to the establishment of hygiene standards for environmental protection in inhabited areas (atmosphere); Law No 2/1976 to adopt the national program for conserving and developing the forestry fund during the 1976-2010 period; Law No 59/1974 regarding land resources; Law No 58/1974 regarding the systematization of the territory and of urban and rural localities; and Law No 42/1975 regarding food products.

Of particular importance for water protection and prevention of water pollution, is Decree No 414/1975, which establishes the admissible limits of major polluting substances in waste water, before the latter can be discharged.

The general law as well as the special laws for protecting environmental factors, include a number of provisions who also contribute indirectly to the regulation of some problems raised by chemical substances and products in the environment.

In addition to this category of regulations of an indirect type, there exist a number of special regulations concerning certain chemical substances and products, or even other products, whose nature can adversely affect the environment. Some of these regulatory acts are: Decree No 466/1980 to regulate the rate and production of toxic substances; Decree No 297/1977 regarding the existence of explosive materials in the economy; Law No 61/1974 regarding the conduct of activities in the nuclear field.

Some references to chemical products in connection with the environment can of course also be found in Law No 7/1977 on the quality of products and services -- which in article 13 establishes, for chemical fertilizers and pesticides, a high content of active substance, good storage qualities and selectivity, and reduced toxicity -- as well as in Law No 3/1978 regarding the assurance of the population's health, particularly in terms of compliance with hygiene standards, environmental protection, and rational nutrition (article 53), and in connection with authorization for manufacture, and the issue of registration certificates for drugs and biologic products (chapter VII, articles 156-172).

In addition, a number of detailed regulations, some of them similar to technical standards, contain orders and instructions from the ministers of health and of the food industry, regarding the use of chemical fertilizers and pesticides, as well as labor protection rules for those who work in this domain.

2. Major Provisions of General-Type Regulations

For the protection of the atmosphere, Law No 9/1973 regarding the protection of the environment (article 2) stipulates as a principle that it is forbidden to release deleterious substances into the atmosphere in the form of gases, vapors, aerosols, solid particles, and so on, in excess of the limits established by prevailing regulations. This interdiction of a principal nature is also stipulated for water (article 13 of the Law on Environmental Protection, and article 11 of the Law on Water), including the prohibition of discharging waste water either in the soil or subsoil (article 19 and article 22 of the Law on Environmental Protection), or in other environmental areas, without first purifying it to acceptable concentrations.

The release and discharge of substances, materials, and waste water are allowed only if they comply with concentration specifications, and only under conditions established by specialized organs, while respecting legal provisions.

For instance, Order No 623/1973 of the Ministry of Health, to protect localities from emanations or infiltrations of toxic, flammable, or explosive substances, as well as to satisfy other hygiene requirements, institutes maximum acceptable concentrations (MAC) for polluting substances in the atmosphere; it covers 35 such substances, among which: acetone, hydrochloric acid, sulfuric acid, phosphorus anhydride, chlorine, fluorine, phenols, lead, mercury, and so on, stipulating both temporary and average concentrations. (2) At the same time, this order also establishes minimum health protection distances between housing areas and animal-raising areas (and their annexes), as well as between housing areas and sites for the treatment of liquid and solid waste, these being also used as measures for protection against chemical substances.

Similarly, acceptable limits for the major categories of pollutants are also established for waste water. Thus, according to Decree No 414/1979, the acceptable limits for major substances have been established -- as a function of the dilution of these substances -- for groups of pollutants, as follows: a) a first group that includes 12 polluting substances, among which cyanides, mercury, cadmium, and lead, whose limits are specifically stated in appendix I of the decree; b) for the second group of substances, limits are established by agreement or authorization from the appropriate water management organ, based on state standards or technical standards in the branch; c) for the third group, which consists of substances that are not

stipulated in state or technical standards, acceptable limits are established through special studies. In addition to the first group of substances, whose limits have been expressly stipulated, and the other two categories of substances, whose limits are determined according to stipulated methods, Decree No 414/1979 also identifies (in appendix 2) seven groups of highly dangerous substances, among which are pesticides, carcinogens, and radioactive wastes, whose discharge in surface as well as underground water is forbidden, except in cases in which they do not present a danger to the life and health of men, animals, aquatic fauna, and the economy, and if their discharge has been authorized by the National Water Council.

The above-mentioned regulations also include provisions concerning: prohibition on the operation of units without environmental protection equipment; location of socioeconomic installations; adoption of non-polluting technologies, improvement of technical processes, recovery and utilization of wastes, notification of accidental pollutions, construction of protected and protective zones; expansion of biologic pest control for forests and plants; consideration of the quality indexes of purified water as plan indicators; and so on. (3)

Moreover, the Law on Environmental Protection also contains concrete provisions for the authorization, supervision, and effects of chemical substances (article 20). These establish the obligation of state, cooperative, and public organizations, as well as of physical persons, to use only products approved by legally empowered specialized organs, controlling diseases, pests, and weeds, fertilizing the soil, or for other purposes.

Another provision stipulates that pesticides and other harmful chemical substances must be used in agriculture and forestry under the supervision of specialized organs and with observance of their indications. Moreover, considering the comprehensive and lasting effect of chemical substances, the law specifies that the methods used to apply pesticides or other chemical substances, as well as the quantities used in applications, must not have the immediate or lasting effect of exceeding limits that could negatively influence the properties of the soil or other environmental factors, the ecologic balance, or man's health.

We should point out that while all the cited regulations assure the protection of one or another environmental factor with various means and methods, the observance of these regulations as a whole is meant to protect all aspects of the environment, maintain the ecologic balance, and obtain a higher economic efficiency for a well defined goal, namely, the creation of increasingly better living and working conditions for present and future generations.

3. Major Provisions of Special-Type Regulations

The special regulations include detailed provisions associated with all phases of activities that involve the existence of products and chemical substances, and institute a complex legal framework for them. In this respect for instance, Decree No 466/1979, regarding the existence of toxic products and substances, determines a comprehensive sphere of regulations for activities associated with these products and substances; it thus provides in article 1 that the production, storage, and any other activity regarding the traffic of toxic products and substances, the cultivation for processing purposes, of plants which contain such substances, as well as experimenting with toxic products and substances, are subject to conditions

established by the decree. (4) At the same time, this regulatory act identifies all the activities which fall under its scope, stipulating that by the production, storage, or any other activity concerning the traffic of toxic products or substances is meant, depending on circumstances: fabrication, preparation, testing, conditioning, delivery, procurement, use, packaging, transportation, storage, handling, importation, and exportation of these products and substances. We stress the point that the regulations are especially aimed at the relationship between chemical products and substances, and the protection of the environment, or as the case may be, the protection of human settlements, human beings, plants, animals, as well as material goods.

The following categories of problems can be found among the special regulations: authorization and registration; organs authorized to perform these operations, the groups that can receive authorizations and permits, and their obligations; technical standards for classifying products and substances as a function of toxicity, noxiousness, and/or flammability; technical standards for manufacturing and conditioning chemical products and substances; technical standards for packaging, transporting, storing, handling, and using chemical products and substances; technical standards for destroying or neutralizing products, or as needed, decontamination following operations that involve chemical products and substances; notification for projects that involve the use of chemical products and substances; instructing and educating personnel; and responsibilities.

Authorization and Registration

As a general rule, chemical products and substances are subject to authorization, including approval and registration. The performance of these operations requires close collaboration among a number of state organs with responsibilities in various domains, and in particular among the Ministry of Health, the State Committee for Nuclear Energy, the National Water Council, and of course, the National Council for Environmental Protection, with its general jurisdiction over environmental affairs.

Depending on the category of products and substances, their harmfulness, and their destination, products are approved by a specialized organ with proper jurisdiction, authorizations are issued for socialist units whose activities involve chemical products and substances, and registration is carried out. In principle, only state and cooperative socialist units (organs, state institutes, enterprises, collective households, and so on) can use chemical products and substances in their activities, and only for purposes stipulated by law; and in some cases strictly determined by law, physical persons may also be so authorized, particularly for medical prescriptions, and for the use of some fertilizers and pesticides on lots associated with their households.

Two situations must essentially be considered in connection with authorization and registration: a) socialist units which are established for the purpose of operations that involve chemical products and substances, must register with the militia in their territorial (county) area, a general authorization being included in their constitutional documents; b) other socialist units, in order to conduct operations with chemical products and substances, must obtain authorization both from a specialized organ and from a territorial state inspectorate for the protection of labor, and they must register with the militia organ in the area of their headquarters. (5)

Socialist units which receive authorization and register in order to conduct operations with chemical products and substances, must meet the conditions stipulated by law for safety in all phases of their operations, so as to assure real protection for all aspects of the environment.

These socialist units must thus maintain records of the receipt and issue of chemical products and substances in special registers, and must provide appropriate tooling and installations, protection equipment, and so on.

We should moreover point out that the organ which has issued an authorization can withdraw or suspend it when legal provisions are violated, or in individual cases, when subsequent research shows that a given product or substance presents risks that were unknown at the time of its approval. Similarly, when activities with chemical products and substances cease, the authorization must be returned to the proper organ, and the militia organ which has provided the registration must be informed. It should also be added that much more detailed and severe provisions exist in the nuclear field, authorization for activities in this domain being issued only under the guidance and control of the state, and only by legal persons.

Technical Standards for Classifying Chemical Products and Substances

Based on the advice of specialized organs, various chemical products and substances are classified by categories, depending on their degree of toxicity. Products approved for pesticide use are thus classified into four toxicity groups established as a function of the average acute, oral lethal dose (DL 50) of the active substance. (6) Group I includes extremely toxic products, group II highly toxic ones, group III moderately toxic products, and group IV those with reduced toxicity; the products of each group are packaged and labelled with different colors for better recognition.

The higher degree of toxicity of these products demands more severe measures in activities associated with them, since their danger to human and animal health, and for environmental pollution is generally greater.

Technical Standards for the Manufacture and Conditioning of Chemical Products and Substances

Particularly important in this regard is a strict respect of the technical process specifications approved by specialized organs, of labor protection regulations, and of the obligation for treating waste water before its discharge.

Packaging, Transportation, Storage, Handling, and Utilization of Chemical Substances

For the packaging and transportation of chemical products and substances, a number of requirements must be met for container security, for distinctive labelling indicating degree of danger, and for safe means of transportation, by instructing the personnel involved, obtaining transportation orders, and designating escorts. The transportation of explosive materials also involves specific requirements to safeguard them.

Similarly, storage and handling demand a number of measures such as: adequate warehouses for depositing and storing, special recording registers, release of products and substances only on the basis of approvals from proper organs and with proof that the receiving unit is authorized to receive them, protection for handling personnel, and so on. At the same time, chemical products and substances must also be used with proper equipment and in compliance with special protection measures, while in the case of pesticides, signs must be posted to indicate treated areas, specifying the period during which pasturing and traffic is forbidden, so that interested parties can exercise proper caution. Falling in the same category are the provisions that establish pause periods for insecticides and fungicides used in agriculture.

Of equally great importance is respect for technical standards regarding the decontamination of protection equipment, packages, devices, and means of transportation, as well as proper purification of the water used for decontamination, or if need be, the destruction or neutralization of products and substances which for various reasons are no longer usable.

We will not delve on the much more severe provisions in the nuclear domain, but we will point out that the law specifies that in principle, the control of nuclear activities does not exclude any other control stipulated by law, which means that the cumulative effects of the different substances are being taken into consideration.

Instruction and Education of Personnel

The regulations examined in this paper place special stress on the instruction and education of the personnel working in activities related with environmental protection in general, and with each environmental factor in particular, as well as of the personnel which works in plants, factories, and laboratories whose specific activities can produce negative effects on the environment. Special instruction is also given to personnel working with chemical products and substances, both for on-the-job protection, and for the protection of life and environmental factors. The instruction and education measures for personnel seek a double purpose: a) technical and professional training and qualification; b) creation and development of awareness, concern, and care for the environment. All these measures stress prevention and control actions against environmental pollution factors.

In the broader sense, tasks and responsibilities for environmental protection are also obviously the province of central and local organs of the state administration, cooperative and other public organizations, as well as all of our country's citizens; in this respect, education in concern and care for environmental protection acquires much greater dimensions. All these measures are intended to create a broad awareness, and a public consciousness for protecting the environment.

Responsibility

The framework law of 1973 regarding environmental protection, the laws referring to certain environmental factors (water, air, land, and so on), as well as the regulatory acts regarding chemical products and substances, and explosive materials,

include provisions about responsibility. According to these laws and regulatory acts, the responsibility for violating legal provisions can be: disciplinary, material, civil, contraventional, or penal, depending on the level of danger of the deed.

With respect to water for instance, an area in which fines and penalties are greater, the following are considered infractions: a) the release or introduction into water (of any category), of waste water, wastes, residues, or products of any kind, which contain substances (solid, liquid, or gaseous) in quantities or concentrations that can change the characteristics of the water, rendering it injurious to the health of men or animals, to agricultural or industrial production, or to fish; b) the placement in operation of units which produce pollution, without purification stations or installations.

These violations are punished with fines of 3000 to 15,000 lei, or depending on circumstances, with prison terms of 3 months to 3 years, and their culpable commission entails attenuated fines or penalties. Penalties increase from 3 years to 15 years and are accompanied by additional penalties, when the deeds have resulted in particularly serious disturbances in the activity of an organization, or have caused significant damages to the national economy.

Even more serious penalties are stipulated for mass poisoning attempts made against a collectivity through poisoning or infestation of its water.

Similarly, it is considered a contravention for socialist organizations that produce internal combustion engines, to violate their obligation to guarantee that for conditions and duration of use which will be brought to the attention of buyers, the engines will operate in accordance with environmental protection standards.

It should also be noted that according to Decree No 466/1979, it is an infraction, and that according to article 312C of the Penal Code it is punishable by 6 months to 5 years, to produce, possess, or conduct any operation involving the traffic or use of toxic products or substances, the cultivation for processing purposes of plants that contain such substances, or the performance of experiments with toxic products or substances without legal foundation; and that a number of deeds are considered contraventions and punished with fines of 500 to 3000 lei.

Detailed and categorical provisions are made in connection with civil responsibility for nuclear damages, as well as with sanctions for disciplinary, material, penal, or civil responsibility.

Some of the features of civil responsibility in the nuclear domain are: exclusive responsibility of the authorization holder, independently of his guilt; when the responsibility involves several authorization holders, they are responsible in proportion to their contribution to damages, and if this allocation is not possible, their responsibility is assigned in equal parts; determination of a maximum amount of responsibility for authorization holders; and so on.

4. Conclusions

Regulations of a general nature and those of a special nature include a number of provisions and technical standards, compliance with which is likely to assure

prevention of environmental factors pollution, pollution control, as well as elimination of the negative affects that can be caused by chemical products and substances. It is clear that the multitude and complexity of legal problems raised by the manufacture, transportation, handling, use, storage, and other activities required for chemical products and substances, argue for a comprehensive regulation in this domain, an argument that is reinforced by the increasing numbers and types of chemical products and substances.

We believe that in this respect, greater attention should be devoted to the use of biological methods for pest control, and in some cases, for pollution control.

The growing role of legal regulations for environmental protection, and their correct compliance and application, lead to greater economic efficiency, and at the same time to an improved quality of life, by assuring a clean and healthy environment.

FOOTNOTES

1. Nicolae Ceausescu, "Report to the 12th Congress of the RCP," *Editura Politica*, Bucharest, 1979, p 37.
2. Temporary concentration represents the value of the concentration of the polluting substance obtained from an air sample for at least 30 minutes, and the daily average concentration represents the value of the polluting substance obtained either from an air sample collected continuously for 24 hours, or from 12 air samples collected at uniform intervals for one-half hour each over a 24-hour period.
3. Referring to water, for instance, we note that Decree No 414/1979 provides that in establishing locations and production technologies for new economic objectives, and in formulating purchase orders for technical engineering projects, investment holders will also use as criteria the cost of purification installations and the expenses involved in their operation, so as to respect the provisions of the decree. We emphasize that the decree also establishes the deadline (1990) for completing projects designed to meet the values stipulated in the decree appendix; to this end, the appropriate specialized organs, ministries, and other interested state organs are assigned the task of formulating during the 1980-1990 period, programs for building or completing stations or installations for waste water purification, or other measures and projects for respecting established limits. At the same time, the decree stipulates that the objectives which produce significant changes in the quality of water resources, will be assigned priority during the 1980-1990 period.
4. Order No 43/1980 of the Ministry of Health approves the list of toxic substances and of plants which contain toxic substances, naming 120 such substances (among which cortisone acetate, sticric acid, digitalin, yperite, radioactive isotopes, trinitrotoluene, and so on), as well as 46 plants which contain toxic substances, such as: *Arum maculatum* (earth's bounty), *Latura innoxia* (laurel), *Equisetum palustre* (horse's tail), *Lupinus albus* (sip of coffee), and so on.

5. Thus, Decree No 466/1979 determines the purposes -- medical, veterinary, industrial, agricultural, forestry, educational, scientific research, and commercial -- for which socialist units are allowed to use toxic products and substances, and stipulates that these activities are permitted with operating authorizations issued by health and anti-epidemic centers, and by territorial inspectorates for labor protection; it also stipulates that these units must register with the militia organ in their territorial area within 10 days from the date of issue of the authorization. For units of the Ministry of National Defense and the Ministry of Internal Affairs, authorizations are issued by the health and anti-epidemic organ in the health network of these ministries (articles 3 and 4 of the decree).
6. DL means the single dose of pesticide (active substance expressed in mg/kg body-weight) which when administered orally to male and female rats that have fasted for 24 hours, causes the death of 50 percent of the animals during a 14-day observation period.

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STORAGE LAKES TO BE BUILT IN LAKE TEXCOCO BASIN

Mexico City EL SOL DE MEXICO in Spanish 24 Oct 80 p 12-A

[Article by Bertha Becerra]

[Text] Two storage lakes, "Nabor Carrillo," covering an area of 997 hectares, and "Churubusco," covering an area of 267 hectares, are being built in the heart of Lake Texcoco Basin whose salt content is greater than that of the sea. The two lakes will provide storage for 48 million cubic meters of treated sewage water and rain water coming from the Churubusco, San Bernardino, Chapingo, Papalotla and Texcoco rivers.

These projects will provide storage lakes to control and regulate the drainage of rain water from the rivers and the treatment of residual waters.

The first phase of Lake Nabor Carrillo is completed. An excavation of 3.7 meters has already been achieved and the clay is being compacted to extract water from the subsoil. This lake will have a storage capacity of 36 million cubic meters. Its outer rim is now being constructed.

"In addition," Engineer Gerardo Cruickshank Garcia, spokesman for the Lake Texcoco Commission, advised, "in the case of Lake Churubusco, which is to cover an area of 267 hectares, we are injecting air into the subsoil to extract the salt water and eliminate the methane gas."

A total of 80 cm has been excavated up to now and, upon completion, it will have a depth of 3.5 meters. It will have a capacity of 12 million cubic meters of water.

Two large lakes will be built in the middle of huge Lake Texcoco Basin to serve as storage lakes for sewage and rain water coming from various parts of the city.

The Lake Texcoco Commission is currently completing all the infrastructure work required to resolve the problem facing the entire basin area. The plans and programs have all been approved by President Lopez Portillo and Francisco Merino Rabago, head of SARH [Secretariat of Agriculture and Water Resources].

With regard to the Lake Texcoco Basin problem, Engineer Cruickshank Garcia said that "it stems from the ecological deterioration of the area in that a combination of convective and low-sweeping winds raise great quantities of dust and other harmful elements which considerably increase the contamination level in the metropolitan area of Mexico City and neighboring towns and cause high incidences of pulmonary diseases among the people."



The expert pointed out that the ecological deterioration was caused by heavy deforestation and erosion of the beds of all the rivers which drain into Lake Texcoco as well as by the drying up of the lake itself due to heavy evaporation in the area and the high salt concentration, higher than that of sea water.

He said that the underground water in that area is also highly salty and is found within a few centimeters from the surface. Its evaporation is continuous and leaves the well-known layer of salt on the soil.

In addition, demographic pressure, which is very strong in that area, and accelerated population growth are producing quantities of solid and liquid waste, generally out in the open, which enables the convective winds to spread fecal germs and thus infect a large part of the Valle de Mexico.

"From this," he asserted, "it is deduced that the basic objectives of the work and action of the Lake Texcoco Commission are to restore the area's environmental cleanliness and ecological balance, control and decrease environmental contamination and take advantage of the area's water, soil and forest resources in a rational manner for the overall development of the towns located in the Lake Texcoco Basin area."

Among other things, he revealed that 83,904 trees had already been planted in the northeastern part of the basin and 81,490 in the eastern part. There are an additional 410,000 and 610,000 seedlings in the nurseries of "La Almeys" and "Del Ranchito," respectively.

Work is also being done on the construction of sports arenas, children's playgrounds, day nurseries, buildings for cooperatives and welfare centers in Santa Cruz de Arriba, San Pablo Chauxtingo, La Purificacion and San Miguel Tlaixpan.

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CSO: 5000

PROBLEMS OF CONTAMINATION OF LAKE MANAGUA DISCUSSED

Managua BARRICADA in Spanish 12 Nov 80 pp 6, 9

[Article by: Pablo Emilio Barreto Perez: "Pollution--Everybody's Challenge"]

[Text] One of the challenges being faced by the Sandinista Revolutionary Government is the problem of "pollution" which was left to us by the Somoza dictatorship and the United States imperialist monopolies.

By way of example we have here Lake Managua right along the capital. We have taken this matter up on other occasions in the past and we are doing so again now because of the economic, social, and biological importance of Lake Xolotlan to our entire people, particularly Managua and all of the people living along its shores.

This lake is one of the country's most important natural resources, Hundreds of people depend on it, especially regarding fishing.

If one looks at the lake from a distance, it looks beautiful, like a mirror reflecting the sunlight. However, when one walks along the shores of the lake from the northwest of Acahualinca, to a point near Augusto Cesar Sandino Airport, the situation looks vastly different.

Intolerable Stench

We are told that a part of Acahualinca stands on an old garbage dump and that the lake's waters cover a large portion of the soil in the district.

The Managua city dump has been piling up for many years northwest of Acahualinca. Every day, an average of 150 trucks will dump garbage, waste of all kinds, which is partly burned while the rest is compressed.

This garbage contains various things: (1) The 150 truckloads come from government vehicles, not taking into account the garbage coming in by private transport; (2) Scores of persons can be seen at the dump, rooting around among the garbage for something they might be able to use. This is the result of serious unemployment which the Somoza dictatorship has left us as heritage; (3) The garbage keeps dropping into the lake's waters which causes them to deteriorate more and more each day.

The stench at this place comes from various sources: Dead animals, burned tires, decomposition of organic matter, etc.

Foul Waters and Desolate Panorama

The press and information officers from IRENA and comrades from Environmental Quality inspected the shores of Lake Managua.

We were quite familiar with this situation because we mentioned it many times during the epoch of the dictatorship. The comrades from Environmental Quality observed the degree of garbage pollution spreading toward the lake's waters.

Waste of all kinds falls into the waters, including old scrap iron and junk, dead animals, plastics, wire, etc.

Opposite this site of tremendous pollution, there are various types of water plant developments, which are mixed with all kinds of garbage. The lake water practically cannot be seen because of the plants and the garbage covering it.

The water looks dirty and the panorama is frankly desolate. Opposite the garbage dump is a lagoon full of stagnant water into which the waste from the Ifagan slaughterhouse is dumped. That lagoon also stinks because the entrails and the blood from the slaughterhouse are dumped into it. Some people go there looking for entrails to use as fat or suet, on the one hand, or to use the guts for making sausages.

Managua's Biggest Sewer

Northwest of Acahualinca is the outlet for one of Managua's biggest sewers; the pipe faces toward the shore which is lined with many low-income homes in Acahualinca. These people have been putting up with this stench for many years and they live in a contaminated environment. That is all the Somoza dictatorship ever gave them.

Worst Pollution

Coming out opposite those low-income housing units, the black waters spread out and a portion of the waste gets stuck among the vegetation and the shrubbery in the surrounding area; the rest of the garbage is carried toward the lake's waters.

Because of this tremendous accumulation of waste, it is impossible to walk along the lake shore because it has been turned into a swamp.

Continuing west from the garbage dump, we reach a place where the chemical waste from the Pennwalt Company comes out. One can say that this is the worst contamination in Lake Managua. Although the volume is considerably smaller, the mercury has turned this problem perhaps into the most serious source of contamination for the lake's waters.

Taking this into account, what is the condition of the water in Lake Managua in this sector where the waste comes out? That waste comes out north of the Coast of the Martyrs.

We were there many times and that gave us an opportunity to see how the flora in the surrounding area has deteriorated. First of all, within a radius of about 200 meters, you can smell a very strong odor which makes any prolonged stay in that part of the lake intolerable.

Over a considerable section, the waters look yellowish and reddish. The small plants in the area have disappeared as a result of environmental pollution.

To spend a little while there, you have to go to the east, because if you stay in the west, the air is impossible to breathe within a radius of 500 meters.

So we must ask ourselves this: What happened to the lake's fauna here? What degree has this pollution reached? This is a part of the funereal heritage left to us by the dictatorship and the imperialist monopolies, which include the Pennwalt Company. It must be remembered that the Yankees themselves did not allow those factories to operate in the United States. It does not matter to them that the Latin Americans die; it does not matter to them that the natural resources of our peoples are destroyed; they do not care about the health of the workers because the imperialist monopolies only think of robbing, sacking, and destroying.

The problem we have here and which we are trying [passage missing in original] therefore will cost us much money, effort, time, and trouble.

Guts and Buzzards

Precisely north of Acahualinca is one of the most stinking places of Managua. This is still part of the municipal junk yard which has been one of the main sources of pollution in this spot in Lake Managua.

We heard that this junk yard ("the city dump") as some comrades told us, will shortly be shifted toward Los Brasiles.

There is a pipe running from the junk yard toward the lake. That pipe contains guts, blood, and all the waste coming out of the slaughterhouse.

Along the pipe there are various slum huts whose inhabitants keep busy pulling those guts out; they have made holes in the pipe to make it easier for them to "collect" the guts (each on his side of the pipe). We have even seen them crawling into the pipes and we have already published photos of that.

At the pipe's outlet you usually find another person, perhaps somebody we had met earlier during our inspection several days before. At that end there was a young girl who said that her name was Concepcion.

She told us that she does this kind of work for somebody else because she has seven children and no job. They pay her 20 cordobas for every piece of gut and for getting the suet out of it, boiling it, and delivering it ready for sale to a soap factory in Managua.

Around her, there are about a hundred buzzards who are fighting among themselves over the waste. The stench here is incredible.

A little west of that pipe, there is another group of persons busy washing the guts, with thousands of flies buzzing all around under abominable hygienic conditions. After washing, the guts are laid out to dry. Once they are dry, they get a mere pittance for every pound of dried guts which are used to make sausages on the Eastern Market. Is the entire Ministry of Health aware of this?

Here, the shoreline is muddy and the foul odor is awful. This stench spreads all the way to the extension of Triunfo Street.

Rivers of Polluted Waters

If we continue walking to the east, the situation apparently is due to the contamination of dirty water, garbage, and waste.

Continuing in that direction, we reach the district of Carlos Reyna. Along the shore, another sewage water pipe comes out and a little further up, we can see the waste from the beer brewery and the electric power plant.

Here the situation gets really bad. What comes out of the beer brewery and the electric power plant is a river of polluted water. It is mixed with the dirty water and forms a vast swampy and stinking area where you can get sick just walking through.

We found dead animals in the water. In this swamp area, we found two little boats belonging to fishermen from that district. The fishermen walked in that thick swamp full of waste to get into their boats and go out fishing in the lake.

Wells and the Neighborhood

Generally speaking, the sewage water swirls along the waterfront of these houses in the area and their inhabitants inhale that environment of pollution along the shores of Lake Managua.

These stagnant and contaminated waters promote the reproduction of mosquitoes and flies which are carriers of various diseases. We believe that the worst thing is that the people living in the area have dug wells in the yards of their homes just a few meters away from the sources of pollution. The water is found at a depth of one meter and it is certainly polluted.

These waters are used for bathing, for washing the laundry and even for drinking in some cases; they get the water out with buckets or any other kind of container.

Dirty Water Flowing Along Various Districts

The whole situation can be summarized by saying that all of the waste from the factories, the sewage water, the erosion of the Sierras de Managua, the garbage--all of this is dumped into Lake Managua!

For example, the sewage water from Americas (one of the business establishments of the Somoza thieves) flows along the Waspan and Jose Dolores Estrada districts all the way to the lake. Yes, this dirty water flows right through the districts, right in front of the homes.

There is even a new sector, west of the sector of Jose Dolores Estrada, which is called the "King's Highway," because of the current of dirty water rushing by here.

This pollution continues all the way to Tipitapa where the garbage is also burned and dumped into the lake along the shore.

How to Solve This Problem?

Many rivers are also contaminated with sewage water and waste. Here are some examples: Chiquito, Acome, Foneca, Matagalpa, Oro, Bambana, Rama, Masaya Lagoon, Lake Nicaragua, Bluefields Bay, etc.

All of this is a part of the tremendous social and ecological troubles which the Somoza tyranny has left to us. On top of that, we are stuck with unemployment, with a disastrous health situation, sicknesses, housing shortage, destroyed soil, contaminated underground water, etc.

A study is now being done on the degree of pollution in the water and the fish of the lake. This is a serious matter and tremendous economic resources and great efforts are necessary to solve this problem along with a very serious approach and that is a first-ranking challenge to the people and the revolutionary government.

To try to work out medium-term or long-term solutions, the IRENA is trying to figure out how to assemble the officials from the various government enterprises who are directly or indirectly involved in the problem of water and environmental pollution.

For example, the Ministry of Health, the INAA, the INE, the Ministry of Housing, Inturismo, the Government Board of Managua, the National Reconstruction Government Junta, and the IRENA.

We think that that is the level on which solutions to these problems should be found. There are two solutions which are very expensive: Oxidation lagoons and processing plants to separate the waste from the sewage water. How much will this cost? Are these the proper solutions? How to tackle the matter of Lake Managua?

The fact is that we must restore Lake Managua so that we can use it for fishing, recreation, and sports. In other words, this is a natural resource which has great ecological, economic, social, and other implications.

Press, Propaganda, and Dissemination Section of IRENA.--Pablo Emilio Barreto Perez, Director, 7 November 1980.

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KUWAIT

BRIEFS

POLLUTION MONITOR--Tokyo, 3 Dec (KYODO)--Horiba Ltd said yesterday it has won a \$3.2 million Kuwaiti order for an air and water pollution monitoring system. Company officials told KYODO the system, including data-processing equipment, will be installed at a coastal petrochemical complex in Shuaiba. Payment will be made in U.S. dollars and the shipment is scheduled next May, they added.
[Text] [Tokyo KYODO in English 0238 GMT 3 Dec 80 OW]

CSO: 5000

MARINE LIFE THREATENED BY OIL SPILL

Kuwait KUWAIT TIMES in English 12 Nov 80 p 11

[Article by Abdul Wahab Kandil]

[Text]

WHAT BEGAN AS POOR fishing and shrimping turned out to be a major, serious problem affecting the whole marine life in the Gulf region. The recent discovery of large numbers of dead fish in the Gulf area and on the eastern coasts of Saudi Arabia triggered a major investigation.

Nobody knows what killed the fish; however, marine biologists and antipollutionists in the area have speculated on the matter.

For more than a week in late August, 50,000 barrels of crude oil floated to the shores of Bahrain. The clean-up operation cost that country millions of dinars. In addition to clean-up costs, lost revenues to fishermen because of the spill have yet to be calculated.

The Bahraini authorities are prepared to sue those responsible for the spill. It was the first such accident to happen on the Gulf shores, and oil enveloped 14 miles of the island's north and west coasts. Bahraini officials termed it simply a "big spill."

DISEASE

Immediately after the discovery of the oil spill on Bahrain's shores, or more precisely 24 hours later, a new disease was reported on the coasts south of Bahrain. The tendency would be to place the blame on the large

amount of antipollution chemicals used to combat the Bahraini spill.

However, Gulf papers blamed the disease on a "sea bug." The mysterious sea bug was reported to have affected fishermen and swimmers. More than 200 fishermen reported skin rashes, blisters on their hands, sore eyes and faces. A number of persons were admitted to hospitals for treatment.

Similar cases were reported on the island of Saja Abu Nair in the United Arab Emirates (UAE) and others from Qatar to Um Al Quin. The symptoms were the same.

As a ministerial official in UAE described it: a burning sensation on the skin anywhere the water had touched it. Hands were most seriously affected, probably from handling wet ropes.

PUZZLED

Investigation in the region continued and officials dismissed the antipollutant chemicals used to combat the Bahraini spill as the cause of the skin irritant, mainly because it would be impossible for the Gulf currents to carry the chemicals to the affected areas in such a short period of time — 24 hours. The discovery of large numbers of dead fish on the eastern shores of Saudi Arabia added an interesting sidelight

to the question.

Unlike the incident in the UAE, the Saudi fish kills were discovered one month prior to the Bahraini oil spill.

Anti-pollutant specialists and marine biologists in the region were puzzled by the incidents. Committees were established to study the phenomenon. Water samples were collected and sent abroad for analysis. Reports from the analyses have not been returned as yet.

VAGUE

The findings thus far are vague. Experts seem to agree that the new disease and fish kills were caused by some type of marine organism. Similar incidents of dead fish along shore lines occur in the U.S. along the Gulf of Mexico. There it is termed "red tide." It is so named because the water turns a pinkish or red colour. This discoloration is caused by an organism which depletes the water of oxygen, thus killing the fish.

Experts in the Gulf here seem to agree that the recent incidents were caused by a similar organism. Experts from both Aramco and the UAE believe that these incidents may have occurred because of the high temperature in the Gulf waters. Still, nobody knows the effect of warm waters on fish and humans.

MONEY ALLOCATED TO FIGHT AIR POLLUTION

Gaborone DAILY NEWS in English 25 Nov 80 p 1

[Article by Robert Ditshwang]

[Text]

Government has approved P10 m for the control of air pollution around the Selebi-Phikwe mine.

This was revealed by the Environment Engineer Mr R.C. Fulton in a recent meeting reviewing air pollution data attended by representatives from the departments of mines, Water Affairs, Selebi-Phikwe Town Council and BCL officials.

Mr Fulton said BCL has made more improvements over the years in the control of low level emissions of sulphur dioxide.

Currently more work is being undertaken to further the improvements of the working conditions inside the plant.

BCL is currently running a comprehensive monitoring programme in Selebi-Phikwe, he further disclosed.

Mr Fulton revealed that soil and vegetation samples are collected by BCL twice a year and sent to America for analysis.

The Mines Department is also running nine monitoring stations around the mine which BCL has three in the residential areas. Mr Fulton disclosed that BCL Limited is currently installing a weather monitoring station adjacent to the mine hospital so that a detailed information on the meteorological conditions prevailing around Selebi-Phikwe can be obtained.

He informed his audience that the discharge of contaminated water from the tailings dam has been completely stopped. The only water that is now discharged is from the slag granulation cooling pond, he said.

The BCL Medical doctor stated that there was no undue cause for concern regarding pollution but however assured his audience that BCL will continue to cooperate with Government Departments in maintaining and improving its monitoring programme.

MOZAMBIQUE

REPORTAGE ON CONSEQUENCES OF DROUGHT IN TETE PROVINCE

Maputo NOTICIAS in Portuguese 15, 16, 17 Oct 80

[Article by correspondents A. Matonse and Isidro Pascoal: "Tete in Time of Drought"]

[15 Oct 80, p 3]

[Excerpts] 1. Where Nature Is Dying and Wild Fruits Serve as Food

The drought which has ravaged Tete Province since 1978 is afflicting a total of 360,000 residents of the southern part of the region. Under daily attack by this natural disaster, the plant and animal life are dying. Some residents are living on wild fruit, in their quest for a way out of this drama. Cahora Bassa; Mutarara; Changara; Magoe; parts of Moatise; Chiuta; and Zumbo have been invaded by the specter of hunger.

We toured the districts of Changara, Magoe and Mutarara under a broiling sun; the temperature was more than 30 degrees above zero centigrade. The landscape we were able to observe as we covered almost 2,000 kilometers in our Toyota showed the effects of a prolonged lack of rainfall.

What we observed was broad expanses of land covered with dry grass and leafless trees, soil hardened and dried by a lack of water, and tilled fields that for 2 years have yielded nothing--all waiting for the rain that shows no signs of coming.

From time to time gray clouds cover the sky, causing thousands of heads to turn toward the heavens and eye them expectantly. The winds are meanwhile dispelling the clouds, which are giving way to a clear blue sky.

A drizzle will occasionally fall on the dry soil, but it serves only to cool the hot day or night or to moisten the ground. This is what happened last 25 September, on which date--according to the provincial Meteorological Services--the precipitation was 1.5 millimeters. Except for that one day not a drop of rain fell during the entire month. September 1979 was even worse: precipitation for the 30-day period was 0.3 millimeters, while the charts of the Meteorological Services showed 42.6 degrees as the maximum temperature of the month.

For a considerable time there has been no flow of water--nor even any stagnant water--in the beds of many rivers and streams. We counted more than 20 dry rivers

and streams crossed by the road between the cities of Tete and Songo. Along these rivers and streams the thirsty local residents were digging dozens of wells from which they were drawing water up from a depth of many meters.

The largest rivers (and some of their tributaries) do however still contain the precious liquid. It is along their banks that a part of the population afflicted by the drought are settling and cultivating plots of ground, abandoning their customary places of residence for an indefinite period.

Domestic and wild animals also seek out the same rivers to appease their thirst. We were told in Magoe that many cattle had been killed by mines encountered during their extensive wanderings--without the guidance of their herdsmen--in search of rivers that contain water. In those areas where the Rhodesian war of aggression was waged with the greatest intensity, the mines laid by the soldiers of the illegal Smith regime have not yet been completely removed.

Malambe (the fruit of the *embordeiro*) is the wild fruit whose name we heard most often from the mouths of those with whom we exchanged impressions concerning the drought. Another such fruit is the *massanica*, which resembles the cherry, tastes like an apple and is used to make *cachaco*, a traditional beverage. The trees which bear the aforementioned fruits are drought resistant and produce normal crops despite this natural disaster.

"We are in a situation of great hunger, and this is why we are using malambe as a food," an elderly woman told us last 25 September as we were en route to Chioco Locality, Changara District, which had come under heavy attack by the Rhodesians in 1976.

We heard identical statements from the official in charge of Changara District and the administrator of the locality of Chioco, respectively Fernando Zeca Pontesse and Fabiao Bulaunde. "In some areas 100 kilometers from the seat of the locality--areas where the local population receives no provisions--'massanica' and 'malambe' have become part of the regular diet," Bulaunde told us.

It was explained to us, however, that only those populations which have virtually nothing--neither money nor food--have turned to wild fruits as a means of appeasing their hunger. These populations basically consist of people who lived in the areas directly affected by the Rhodesian war of aggression and who because of this aggression had difficulty tilling their fields--so much so that they were compelled to move from one place to the other on occasion. When peace came the drought was already well established, thereby making it impossible to grow any cereal grain.

[16 Oct 80, p 3]

[Excerpts] 2. Local Population Walks Tens of Kilometers To Find a Little Food; Weak Commercial Network Aggravates the Situation

The continual wandering of many people in search of food and water, and the emigration of many people from their traditional areas in order to establish themselves along the few water-bearing rivers and streams that will enable them to practice agriculture and sell their labor in exchange for food or money, are aspects of the situation that reveal the manner in which

Tete Province is affected by the drought--a natural disaster which impacts seven districts of the province.

In rural Mozambique one will customarily see women with their children in tow and heavy bundles on their heads, obviously returning from a store (sometimes many kilometers distant from their residences) where they have made a few purchases. In southern Tete Province this scene is no longer the norm but does occur rather often. People are powerfully constrained to travel in order to survive.

The lengthy travels by the drought-affected populations will not always end up at a store, however; some of these wanderings have other destinations.

Emigration for an Indefinite Period in Search of Employment and Assistance From Relatives

Some of the populations afflicted by the drought are abandoning their places of residence to establish themselves on the banks of the few rivers and streams that contain water, where they hope to dig their garden plots. "Other individuals are leaving their communities and settling along the banks of the Luia River," says Fabiao Bulaunde, administrator of Chioco Locality, Changara District, who spoke to us about the human drama in this area.

This is what is happening, for example, on Cahora Bassa lagoon. According to Manuel Gabriel, administrator of Daqui Locality, Magoé District, "people living as far as 22 kilometers from the lagoon have gone there to cultivate farm plots." An interesting sidelight is the fact that the site is surrounded by hills which served as hiding places when the Rhodesians invaded and partially destroyed Daqui in July 1977.

Accordingly, the people who are cultivating their farm plots along the banks of rivers and streams that contain water are at the present moment harvesting corn and vegetables which will make it unnecessary for them to travel to a distant store in order to purchase these food items. There are other motivations for the adoption of this nomadic mode of existence for an indefinite period of time; Fabiao Bulaunde told us that "some individuals travel to the city in search of employment."

An increasing number of alternative ways to defeat hunger are being developed. Those individuals who do not succeed in arranging something locally are also faced with temporary emigration as the alternative. "These persons will be employed on the farm plots of others; they will work there for a few days to exchange for money or meals," Eusebio dos Santos Martins, administrator of Mocumbura Locality, told us.

[17 Oct 80, p 2]

[Excerpts] 3. Ponds and Wells Take the Place of Rivers

Every day some of the 360,000 people impacted by this natural disaster can be observed along the dry river and stream beds in southern Tete Province.

Numerous wells and holes are being dug along these elongated tongues of loose sand, principally by women, who draw from them the water they need so badly.

Groups identical to those we found on the Demera River are scattered along the dry rivers and streams of the districts of Mutarara, Changara, Magoé, Cahora Bassa, Moatize, Chiuta and Zumbo. Not everyone, however, uses these wells and holes. "The populations living along the banks of the Luia River (in Chioco Locality) obtain their water directly from the river," Fabiao Bulaunde, administrator of Chioco Locality, told us.

"Others," he continued, "are leaving their communities and establishing themselves on the banks of the Luia River, precisely because--unlike many rivers and streams--the Luia still has water in it."

Eusebio dos Santos Martins, administrator of Mocumbura Locality, Magoé District, told us however that such exceptions are few. He informed us that "in the community of Calue (in the same locality) there is no water. The women," he said, "leave home at 0500 hours and do not get back until 0800 hours; it is difficult for them to draw the water from the wells inasmuch as the water level in the wells is very low." Martins also told us about the animal population. He said the swine leave their sties for long periods of time in search of water. The same is true of the cattle, which he said "at this moment are dispersed over the countryside, and some are dying because they come upon land mines left behind in the bush by the same Rhodesians." Then he got something off his chest. "If only we had hand pumps here," he declared, "things would be a lot better."

Nevertheless, so long as the rains are not falling heavily enough to fill the rivers and streams and the hand pumps have not arrived (or have not been repaired, in those cases where they do exist) the well and the hole continue to be--wherever possible--the short-term alternative source of water.

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CSO: 5000

SEYCHELLES

BRIEFS

OIL DUMPING FINE--The Taipan Pride cargo ship has been fined R.10,000 after the ship's master, Mr. Maung Khin, was found guilty of discharging oil into the Inner Harbour, under Seychelles strict anti-pollution laws. On November 21 an officer of the police boat Riga found an oil slick 70 feet long by about 10 feet wide drifting from the Taipan Pride, which was berthed at the Mahe Quay, New Port. Further investigations found the crew of the ship pumping oil from the bilges and throwing the "dirt" into sea. Throwing oil or other pollutants into the sea of the Inner Harbour is contrary to the Harbour Regulations. [Text] [Victoria NATION in English 28 Nov 80 p 1]

CSO: 5000

CENTRAL MANAGEMENT NEEDED TO SAVE CAPE COAST ECOLOGY

Cape Town THE CAPE TIMES in English 20 Nov 80 p 4

[Article by Margaret Jacobsohn]

[Text]

A CENTRAL management body is urgently needed to save the Cape coast from serious ecological damage and severe economic problems, according to a CSIR report. Estuaries of the Cape, released this week.

The report, by Dr A E F Heydorn and Dr K L Tunley, warns that the haphazard development that has taken place along the 2200 km Cape coast in the past should not be allowed to continue.

A great deal of development was taking place "which is neither co-ordinated nor carried out according to ecologically acceptable principles, and in many cases this is having severe economic repercussions".

The reason lay mainly in the present system of delegation of control over sectors of the coast to local authorities who could not be expected to fully appreciate the ecological effects of their actions because they were not trained to do so.

The report recommends that a coastal zone management advisory body be formed to develop a policy which embraced both ecological and economic needs, as well as provide the "vital element of cohesive-

ness" between the authorities.

Such a body would help to:

- Compile guidelines for the utilization of the coastal zone encompassing land, sea and estuaries.

- Provide advice to municipalities, divisional councils, provincial and government departments in problems which arise in the utilization and management of coastal areas.

- Assess applications for proposed developments. Cohesiveness in planning would be promoted if all such applications were submitted to the advisory body for comment.

- Disseminate information relevant to coastal zone management emanating from research institutions.

Other proposals deal with:

- The siting of effluent pipelines. The report asks whether local authorities with problems about pipeline siting should not be given aid by the government to enable the basic redesign of their sewage disposal systems.

Areas of scenic, historic or recreational value should be afforded protection against the injudicious siting of pipelines.

The report uses the Mermaid Pool at East London as an example of an area which had been "totally degraded by a

major sewage outfall".

It also queries the public health implications for the beaches on either side of the outfall and the world famous surfing area seaward of it.

A major problem in many cities was that sewage and stormwater networks were not separated and sewage could be contaminated and become useless for processing.

- The "freezing" of land with unique features. The report deplores the tendency for estate agents to move into an unspoilt area, cut the land into plots, develop road systems and then put the areas on to the speculation market.

"There are too many examples where the coast has been badly scarred by these practices which then fall into disrepair because the market response has been inadequate."

Legislation should be created to "freeze" land until an environmental feasibility assessment could be completed.

- The rights of appeal of existing communities. Many communities had been forced to stand by, watching developments destroy the tranquillity and financial viability of their coastal area. The report recommends that effective channels of appeal be provided.

"It is understood that it may be difficult to halt major schemes which have taken years to plan and prepare, especially in cases where large-scale expropriation of land and property has been involved.

"Nevertheless, great danger lies in this very situation because it severely curbs the flexibility required for development and construction in sensitive environments and the ability to adjust planning according to circumstances."

• The production of fuel crops. The report warns that the balance between the water-holding capacity of the land and the natural occurrence of indigenous vegetation is a topic which requires more attention.

"Present enthusiasm for growing crops for fuel production is viewed with concern if there is a danger of this leading to excessive denudations of indigenous plant cover."

The report also examines the optimum utilization of water resources. It suggests that the water needs of an expanding population will eventually force South Africa to consider desalination of seawater.

CSO: 5000

BRIEFS

DROUGHT CONDITIONS--Despite heavy rains in early October and some light rains this month many areas of Natal and Zululand are still drought-stricken. The worst areas appear to be Heatonville and Ntambana in Zululand where conditions are said to be critical. The Regional Extension Officer at Cedara Agricultural College, near Maritzburg, Mr F Joubert, said yesterday that the grazing situation at Hluhluwe, Zululand was critical and that most of the cotton farmers in the area were waiting for rain before starting to plant. Mr Joubert said that many maize farmers in the Lowesberg, Swartolozie, Dundee and Ladysmith areas had not planted their crops because of the drought. D-day for crop planting was November 15. Several rivers in the Natal Midlands were very low and useless for irrigation, he said. Midmar Dam, near Maritzburg, and Lake Merthley, near Greytown, had dropped to their lowest recorded level, a spokesman for the Natal Parks Board said. Because of this water restrictions had been reimposed at Greytown and water could be used only for drinking. Although Mooi River was no longer emergency grazing areas the emergency continued at Kokstad and Greytown. The only bright spot in a depressing drought situation in the province was that Vryheid and Newcastle had recorded good rains, the spokesman said. [Text] [Johannesburg THE CITIZEN in English 21 Nov 80 p 8]

CSO: 5000

SOIL EROSION DAMAGE DESCRIBED AS 'VAST'

Lusaka ZAMBIA DAILY MAIL in English 3 Dec 80 p 4

[Article by Francis Mwanza]

[Text] **ZAMBIA has awakened to the reality that without pragmatic and unrelenting agricultural policies aimed at boosting food production, agricultural development would go into a stall.**

As a result of this realisation, this year alone, a number of much desired incentives for farmers — intended to flame their desire to produce more — have been introduced.

Some of the incentives recently announced are: a reduction in fertilizer prices; 50% foreign exchange remittance for every extra bag of maize, wheat, and soya beans after exceeding the 5,000 set target; tax incentives which include an accelerated depreciation rate on farm machinery, a concessionary maximum flat rate of 25 per cent on farm income and exemption from tax for five years on dividends from farm income; and a 14.9 per cent reduction in prices of maize seeds.

To cap it all, an ambitious K400 million operation food production to stretch for a decade and to involve over 20 foreign countries has been launched.

Although the incentives and "operation food programme" may help in boosting food production, agriculture still faces a grave threat — soil erosion.

Soil erosion is causing vast damage to land in Zambia: About 10 million tonnes of soil is eroded from the two million hectares of land currently being ploughed.

Some farming areas have become so eroded that farmers have but been left with one course of action — to abandon their farms.

Agricultural experts say that the situation is getting critical as soil erosion keeps increasing, causing near irreparable damage to land.

The worst hit area, according to Mr Denis Sikazwe, planning officer in the Land Use Branch which falls under the Department of Agriculture, is Mkushi's Tembwe area.

Mr Sikazwe said soil erosion in the area had reached a point where farmers have failed to reclaim damaged farm lands and consequently abandoned them altogether.

To reclaim land farmers, firstly, have to stop erosion from continuing by making proper waterways, storm drains, terraces,

and windbreaks. 'Secondly, they have to inject plenty fertilizers into the eroded areas to put back soil fertility since it is the top fertile soil which is usually washed away.

"They have failed because of the expenses involved in repairing damaged land. It costs K30 to K100 just to repair one hectare," explained Mr Sikazwe.

Other areas, apart from Central Province, where erosion is common are Eastern and Southern Provinces where people are highly engaged in farming activities. Erosion in Luapula and Northern Provinces where *Chitemene* is practised is not as common as in the forenamed areas.

Causes of soil erosion, said Mr Sikazwe, are many. He said erosion can be caused by poor farming practices and improper planning of farms; removal of vegetation on slopes; fires; indiscriminate cutting down of trees for firewood or charcoal; overstocking and ploughing down-slope. Overly, erosion is exacerbated by lack of knowledge on soil conservation among farmers.

Said the planning officer: "The Department of Agriculture is aware of the situa-

tion." But efforts to effectively combat soil erosion are "hindered by lack of funds."

However, the department, through the Land Use Branch, is making efforts to provide farmers with professional advice on how to prevent soil erosion and in assisting them in their efforts to control erosion.

On request from a farmer, said Mr Sikazwe, the Land Use Branch would carry out a land capability study of the farmer's area. From the studies the branch would make farm plans which include the layout of roads, buildings, paddocks, waterways and storm drains and other required layouts of the farm.

"The plan is structured in such a way as to help the farmer realise the best out of his land and at the same time preserve the natural resource of his farm," explained Mr Sikazwe.

The branch also tries to locate soil erosion potential areas by examining farming methods in agriculture land. Once such areas are located owners are instructed to carry out conservation works or protective measures against erosion.

Some of the protective measures against wash away are ploughing across slopes,

formation of properly planned waterways and storm drains, discriminate cutting down of trees, and early burning.

"Fires can be controlled by formation of fire guards around the farm and paddocks so that not the whole place (farm land) is burnt when fire is set

on dry vegetation in one part of the farm," added Mr Sikazwe.

A farmer who fails to carry out protective measures against erosion — and thereby encourage soil erosion — could have his land tenure lease terminated, said Mr Sikazwe.

He added that the establishment of the Natural Resources Conservation Act of 1970 was to see to it that soil and other natural resources were conserved — and those failing to conserve them prosecuted.

Farmers in reserve lands were also compelled to carry out soil conservation measures as it was considered a serious offence to encourage soil erosion.

But although efforts aimed at controlling erosion started as far back as the late '20s, the rate of erosion is increasingly getting alarming.

What is worsening the situation, as already pointed out, is

the lack of adequate funds for use in effectively combating erosion.

The Land Use Branch needs funds for carrying out soil erosion surveillance activities. But because of insufficient funds, the activities of the branch are limited to only a few areas.

Like many other developing countries, Zambia's essence or existence — and it has firmly been endorsed now — largely depends on agriculture which in turn depends on good farming areas.

With farming areas being threatened by soil erosion — one of the greatest menaces to agriculture, will the country's agricultural development take off?

Said the then Agriculture and Water Development minister, Mr Alexander Chikwanda, when he officially opened the third meeting of the eastern African sub-committee for soil correlation and land evaluation: "If no scientific measures are found to arrest soil erosion in Zambia, the country will not develop agriculturally."

Thus, apart from giving farmers incentives and launching ambitious agricultural programmes like

"operation food programme", the government should provide adequate funds to the ministry of agriculture for use in fighting erosion which is posing a threat to the development of agriculture in the country.

CSO: 5000

ECOLOGY AFFECTED BY 'LAND RUSH'

Salisbury THE HERALD in English 6 Dec 80 p 8

[Article by Maurice Hammond]

[Text]

WITH independence a whole new scene has opened up in the environmental field which experts say will demand a land use plan for the whole of the country.

One expert in Salisbury explained to me this week: "For years in the rural areas there has been a mounting population which could explode any moment. Over-grazing, poor land utilisation, deforestation for fuels have all helped to erode these areas. Population pressures will force the Government to redistribute land, particularly in what up to now have been white farming areas."

"The same pressures will inevitably cause the politicians to cast their eyes in the direction of our national parks."

At present the commercial farming areas are comparatively underpopulated and conservation techniques are applied to the full. Reafforestation, grassing, contour ridging all help to conserve the soil.

But as land redistribution comes into effect, and the expert is confident that it will in some form or another, more people will move on to the land — people who are less expert in conserving it.

Zimbabwe's ecology is finely balanced and any moves which upset it could bring big trouble.

One danger, paradoxically it might seem, could come from irrigation schemes for peasant farmers on what is now virgin land. If the vegetation is destroyed erosion inevitably occurs and lands downstream and dams suffer because of silting.

This is why trees are so important on any farm. They act as windbreaks, they have a cooling effect on the land, they help to bind the soil and they provide fuel and poles for housing.

BALANCE

But the experts fear that if the larger farms are turned over to small-scale operations with a resulting higher density population the trees could suffer, as they have done in tribal areas.

For the same reason there is a danger of upsetting the balance if any of the wildlife areas are opened up to any degree for farming operations.

This happened in India where on the slopes of the Himalayas vast irrigation schemes were opened up some years ago. The trees and vegetation were destroyed, proper conservation methods were not used and rivers became silted up.

Then the rains came, the rivers could not cope because of silting and burst their banks. The result was that big areas

of the irrigation schemes were suddenly under half-a-metre of sand and stones and became useless for cultivation.

The expert also told me of another theory of why Lake Malawi has risen in recent years, causing damage to shoreline properties.

"I'm pretty certain it is because of silting that the level has gone up. In recent years there has been much more cultivation on the slopes above the lake resulting in soil erosion and a heavier water run off."

He fears the same thing could happen in Zimbabwe and poses an interesting thought about Lake Kyle.

Many knowledgeable people said when the dam was constructed that it would never spill. Well it has, but the question being asked is did it spill because of heavy rains over a two or three-year period or did it do so because the lake bottom had risen through silting?

Apparently little is known about the various depths of our many man-created lakes and there is little or no monitoring done.

The danger from the population explosion is there, says the expert, and there is no easy way out for the Government. Proper planning of overall land use will help and one ray of hope is that now people in rural areas are governed by popularity-elected leaders they will respond more readily than they have in the past to conservation education.

ENGINEERS WORK TO RESTORE WATER SUPPLIES

Salisbury THE HERALD in English 2 Dec 80 p 7

[Text]

PROVINCIAL water engineers for Matabeleland, Mashonaland and the Midlands yesterday reported "good progress" on work to restore water supplies disrupted during the war.

Minor breakdowns of equipment and a lack of spare parts for pumps had been the only problems so far in the charges of the Ministry of Natural Resources and Water Development to improve the supply of water in tribal areas.

In Gwelo, the provincial water engineer for the Midlands, Mr Michael Tim, said a shortage of imported spares had "slowed down" work, but the problem was being resolved.

The province had a big task ahead with between 1 600 and 2 000 boreholes to be worked on in the Gokwe TTL alone, and another 80 in Bellingwe.

Mr Tim said it would take about two years to complete work on the boreholes in Gokwe.

Workmen would first concentrate on priority projects at schools and elsewhere before turning to other needs.

Matabeleland's provincial water engineer, Mr J. H. Norton, said in Bul-

away that "all areas" had been affected by water shortages.

But he said: "We are making good progress. Drill staff are working long hours under difficult conditions and in some areas we have completed work."

Many boreholes were working again, but further progress would depend on the rains. It would be "very difficult" to move drills if the rains affected the roads, he said.

Mr S. Cumming, the provincial water engineer for Mashonaland, said in Salisbury that five drills were out in the countryside cleaning out boreholes or making new ones.

Mr Cumming said hand pumps for boreholes would be supplied and that authorities were also investigating improving village water supplies by using bigger engines to pump water to reservoirs.

Some breakdowns had been experienced but on the whole, "we are progressing quite well", he said.

The Ministry of Health has said the problem of water-borne diseases such as bilharzia would be solved with the provision of adequate safe water in the rural areas.

MINING COMPANY RECLAMATION PROJECT DETAILED

Salisbury THE HERALD in English 3 Dec 80 p 15

[Text]

THEY'RE getting ready to put back something very precious into the soil at six Anglo American Corporation mines in Mashonaland and Matabeleland. They're going to put down roots.

Frail roots that are now feeding 400 000 eucalyptus seedlings carefully being exposed to the summer sun at a nursery at Ruwa, outside Salisbury.

Roots that in five years will anchor sturdy pole-straight trees in land up to now neglected and bare.

The trees will yield wood for every mine purpose, from pit props to kindling. Felled, the stumps will coppice into vigorous multiple fingers, each growing as straight as the original. The same bole will be good for at least four "crops".

"Operation Roots" is the corporation's acknowledgement of a serious problem, and is a serious

beginning to try to get to grips with it.

Staked against the nation's need, these six plantations — these 400 000 trees — will be like scratching up a meagre patch to feed a million. But it is a start, and a determined one.

"We are encouraging this campaign as a matter of urgency to draw atten-



NATIONAL TREE DAY

tion to the need to preserve a vital national resource," says Anglo divisional manager Mr Roy Lander. "And we hope others will do the same."

He speaks for Border Timbers Limited, as president of the Timber Promotion Council and as managing director of Bindura Nickel Corporation.

The tree chosen for the Anglo involvement was the eucalyptus grandis, a strong and straight grower which in the best conditions can reach to 30 m in five years.

But the sites awaiting most of the 400 000 seedlings are far from ideal — Wankie Colliery, Shangani Nickel Mine, Filabusi (Epoch Nickel Mine), Shamva (Madziwa Nickel Mine), Bindura (Trojan Nickel Mine) and Mazoe (Iron Duke Mine).

Where the areas are dry and inhospitable the trees will have to be irrigated with effluent. At other mines water draining off the slimes dams and processing plants will be used. In all cases it will cost labour, materials, time and care.

"The effort must be made, because we want to show that it will be worth it and that the mining industry recognises the need to replace timber which it has been accused of cutting indiscriminately in the past," said Mr Lander.



NATIONAL TREE DAY

Operation Roots follows a detailed feasibility study of the sites by Mr Neil Cardwell, forest manager of Rhimbiok Farms, Umvukwe.

"This is a pilot scheme which we hope will be followed up," he said. "Unless we get stuck in as a nation and grow trees we will quickly have a runaway situation on our hands."

With about five million Zimbabweans using wood every day to cook the family meal, the spectre of massive denudation of the country's indigenous trees is a very real one.

So real that the Prime Minister's "Day of the Tree" public awareness campaign comes too late in some areas where people have had to turn to cattle dung for fuel.

Meanwhile about half a million eucalyptus seedlings are putting out leaves and gathering strength at the Ruwa farm of Mr Ian Percy in readiness for the big transplant operation this month.

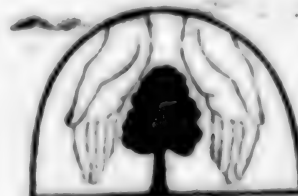
He was called in to grow them — from a 4 kg

bag of tiny seeds — because the Forestry Commission was fully extended on other projects in conjunction with the Whitson Foundation to establish woodlots in tribal areas where the damage to natural woodland has been worst.

"It has been a marvellous experience, growing these trees from seeds so fine they have to be planted with a watering can, and knowing they

will become plantations in different parts of the country," said Mr Percy.

Meanwhile, too, the miners are tilling the land — to put back something as valuable in its own way as the minerals they are taking out.



NATIONAL TREE DAY

LOCAL AUTHORITIES FAIL IN ATTEMPTS TO HALT INDUSTRIAL POLLUTION

Dispute with Chemical Combine

Moscow SOVETSKAYA ROSSIYA in Russian 20 Aug 80 p 2

[Excerpts from article by N. Kolesnikova, special correspondent: "Apples of Yasnaya Polyana"]

[Text] At the farewell she called her guests into the garden and treated them to apples from the oldest trees that were planted by Lev Nikolayevich. The apples were not yet ripe so were sourish. But at the thought that they had a direct relationship to Tolstoy, they became sweeter. Someone, taking advantage of the generosity of the hostess, filled his pockets. "I will take them to Moscow and will preserve them as a dear relic." She smiled: "They will not preserve, not today's apples."

Everyone was in an uplifted mood that occurs after visiting these places, therefore no one listened to the sad intonation of her last words. On the road to Grumant (which previously was the farm of Tolstoy's grandfather) she tried once again to attract attention to what pained her heart: "Look how the leaves on the trees have turned brown. This is not autumn, this is chemistry. The forest is dying..."

The guests who understood nodded their heads: "Yes, yes." It turns out that they already know everything. But such indifferent omniscient airs are worse than ignorance: to know and not to think, not to experience, not to shudder.

In 1965 the irreparable occurred. The misfortune approached silently. The forest ranger began to notice wilting of the trees and leaves falling earlier than the season. They first thought that pests had attacked the trees, but studies did not confirm this. "When the leaves fall the tree is cleaning itself of harmful substances," thought Yuliya Klement'yevna, but she could not understand one thing. Where are the harmful substances coming from? The explanation came during studies made by different scientific institutes, including the central forest management enterprise "Lesproyekt." They asserted: "In the 1960's a major industrial complex grew up around Yasnaya Polyana. All of these powerful, and sometimes, super-powerful enterprises are continually polluting the atmosphere and the hydrosphere. They have caused a change in the microclimate and the hydrological pattern of soils and ground. This has led to a disruption in the forces of nature in Yasnaya Polyana and in certain cases has already surpassed the potentialities of its natural self-defense." Is this not a threatening diagnosis? From an external glance at Yasnaya Polyana it is difficult to believe that a "disruption of the forces of nature" took

place here. It is true that if you accidentally brush against an evergreen at "the beloved bench" needles immediately fall off of it. And these are little evergreens, new ones that were recently planted. They still have the forces of resistance. The planners were invited after an event occurred in 1964 where all the coniferous Tolstoy memorial trees died at once: the evergreen avenue on the "prospect," the small evergreens behind Chepyzh, and the evergreen diamonds at "the beloved bench." Why did they die? As Yuliya Klement'yevna will assert later at the most diverse commissions, they died as a result of the strong emission of nitric oxides into the air by the Shchekino chemical kombinat.

In the spring of 1965 a new strong emission of harmful substances burned all the buds in the apple orchards. Yuliya Klement'yevna went to the chemical kombinat. "There were no emissions," they audaciously told her. "You are most likely taking poor care of your orchard. All the trees in the settlement of chemists are alive." She was not insulted, but was shocked at the ecological ignorance of the leaders of the sound enterprise. For everyone around knows that wind roses here are such that the emissions of the neighboring enterprises are carried by a direct route to the museum sanctuary, by-passing the nearby settlements. She was also disturbed because the conversation was not about the sanctuary of worldwide importance, but about her personal orchard. They told her, "We are ready to compensate for damages, if the commission so decides."

She wanted to cry out "You cannot compensate for such damages! Trees did not simply die, these were the memorial plantings, the living memorials that a decree of the VTsIK [All-Russian Central Executive Committee] in 1921 charged to be preserved 'in a historical and untouched form.' They can no longer be restored." But instead she said: "We will fight you."

"Ammonia gas is not a poison," she was angrily told at the high meeting by a man called upon to defend the interests of the chemical kombinat. Everyone turned to her with silent censure. She was the only woman at this representative forum.

"Ammonia gas is not a poison when it is kept in a closed vessel and enters the soil in the form of a solution," she answered with a challenge, and advised them to look at the condition of the grass and the trees at the railroad siding on which tanks with ammonia gas and other raw material are conveyed to the chemical kombinat. The chemists did not know that agronomist Fedorova became interested in the production technology after the death of the trees in the sanctuary, and had studied it just as well as her own orchards.

After a certain time, after the work of the responsible commission, a decision was made which established control over the actions of the chemical kombinat. This was a victory, but its celebration was short. In the spring of 1966 a new emission of harmful substances destroyed the just planted underbrush. The century-old oaks began to die. Another serious decision was made.

Fedorova went to the chemical kombinat again. But the chemists were irritated: "Did they not cut out the enterprise expansion? Did we not pay for the damages? What more do you want?" But she saw that the enterprise was nevertheless growing, and answered: "Where are the planned treatment works? And why are the production wastes burned directly at the enterprise?" For not only nature suffers from this, but also people. Previously the kombinat laboratory gave her information about air pollution. Now they do not. She understood that the resistance was taking a serious turn.

In 1967 the chemical kombinat "burned up" the entire apple crop in the village of Yasnaya Polyana. The village inhabitants took the chemists to court. There were apples in the museum sanctuary. They hung on the ends of the leafless, burnt branches. They held on with their last strength, as though from respect for their mistress. How can you otherwise explain such a phenomenon? The specialists said that the apples in the sanctuary survived only because they had many years of systematic care.

Fedorova did not write about her misfortunes to just anywhere, she wrote to the State Committee for Science and Technology. Her belief in the strength of science was based on practical experience. The scientists responded quickly. First of all, they started the Verkhne-Volga administration of the hydrometeorological service working. It was assigned the regular taking of air samples in Yasnaya Polyana. Since then the objective data about atmospheric pollution in this region have become public. They are published in each annual survey of the service. Secondly, the famous scientists wrote a letter to the Tula party obkom. Thirdly, a committee was set up for the protection of Yasnaya Polyana. It meets twice a year, in spring and in fall. Not only scientists and active members of the Society of Environmental Protection participate in the committee's work, but also the local authorities and the leaders of the neighboring enterprises. The latter were obligated to report to the committee what measures they were taking to protect the environment from pollution. However, many of them do not take the trouble to be present at the committee, as occurred the last time. The oblast SES [sanitation-epidemiological station] also ignores the committee. The SES by its purpose should be on the side of the sanctuary.

But the main business of the committee is to help the sanctuary. However, such a serious state problem cannot be held up forever on the enthusiasm of only one public committee. The number of conflicts between Yasnaya Polyana and the surrounding industry increases each year. For some reason the industrial workers are confident of their impunity. They began to build a road almost on the territory of the sanctuary. The museum curators did not know this until they saw it with their own eyes. The industrial workers succeeded in advancing the road 1 kilometer. Now they are building an agricultural complex on its boundaries. All the effluent will go into the Voronka River and all the cattle will graze in the Yasnaya Polyana meadows. It was decided to protect the sanctuary from the cattle and a ditch was dug on the border. But at night the workers of the agricultural complex filled it in. Sad, and funny. But here the museum was victorious. They did not remove the agricultural complex from the borders, but they stopped its expansion.

Somehow there was an evening meeting of the classmates of Yuliya Klement'yevna in the Timiryazevskiy academy. Many of them have become famous horticulturists and breeders. In their midst she seemed a small and insignificant person whose life passed in a struggle with windmills. She first thought that she had not realized her life's dream, and lamented the fact. Where were the apples that she had set out to raise? Where was the restored glory of the ancient Tula strains? She came from the capital unexpectedly quiet and immediately went to the orchard. It was the middle of June. In Moscow the poplars had already blossomed, but the Yasnaya Polyana orchard was as though dead, frightened by sudden heat. The buds opened up with difficulty, but the sparse rosy white flowers on the dry branches indicated that the revival had begun. "Spring has come," thought Yuliya Klement'yevna, and sighed, "No matter how it has deviated, it has come. Miracles are happening in

front of our eyes. Each day is a new miracle. This was a dry branch, and suddenly it has leaves. God knows that from somewhere underneath, from under the ground, green things, yellow, blue, creep out. Some animals, like madmen fly from bush to bush, and then whistle with all their strength, and all is wonderful. There are minutes of happiness that are stronger than these, but not fuller and more harmonic than this happiness." Once again she did not notice that she was thinking excerpts from Tolstoy's diaries.

Follow-up Article: No Results

Moscow SOVETSKAYA ROSSIYA in Russian 14 Oct 80 p 2

[Article: "Once More about Yasnaya Polyana"]

[Text] On 20 August of this year, our newspaper printed the essay "The Apples of Yasnaya Polyana." It raised the question of the proximity of the museum farm of L. N. Tolstoy to the Shchekino association "Azot" that was fatal for the Yasnaya Polyana nature. The editorial office received many readers' responses to this publication. Their authors were disturbed at the situation. "Yasnaya Polyana is a holy place for the Russian people. As long as the chemical kombinat has been built and it is not possible to move it to another place," writes I. Kravtsov from the Kemerovskaya oblast, a veteran of the Great Patriotic War, "all necessary measures should be taken to protect nature from the harmful gas emissions. Control should be set up over the system of purification works at the kombinat."

Unfortunately, the departments that are responsible for the fate of Yasnaya Polyana are not hurrying to answer the editorial office. The Ministry of the Chemical Industry is silent. The state inspection for control of gas-purification and dust-trapping structures is silent. The oblast sanitation-epidemiological station that was directly criticized is silent.

We received responses only from the Tula CPSU obkom and the all-union association of the nitrogen industry "Soyuzazot."

This is the viewpoint of the Tula obkom: "The problem remains as before. In addition to the measures to be taken in the oblast, these questions should be solved with the attention of the ministries of the chemical, metallurgical industry of the USSR, as well as the USSR Ministry of Power and Electrification whose enterprises are mainly located in this zone."

The chemists look at this problem in quite a different way. The deputy head of "Soyuzazot", V.Ye. Lukashinskiy writes the following to the editorial office: "Special attention is given to environmental protection questions at the Shchekino production association 'Azot.' Considerable work has been done at the enterprise to reduce the emissions of harmful substances into the atmosphere. As a result the condition of the air basin has been significantly improved. Over 250 measures have been introduced to reduce emissions of harmful substances into the atmosphere. Fifteen million rubles have been spent to fulfill the environmental protection measures through capital construction, and considerable resources from the enterprise fund. 'Soyuzazot' annually gives 150,000 rubles for scientific research work to the museum farm 'Yasnaya Polyana'." Comrade Lukashinskiy reports in particular, that the Shchekino association "Azot" controls the condition of the air basin in the village of Yasnaya Polyana round-the-clock for all components of possible atmospheric pollution. It would seem that there is complete well-being?

In fact, the Shchekino association has a laboratory that regularly takes air samples, but the data of its analyses do not go outside the enterprise and are kept in secret. You ask why do they spend enormous amounts of money on research that does not have practical realization? At the last, spring meeting of the committee for the protection of Yasnaya Polyana, the laboratory workers refused to report to the public the results of the May analyses. The comrades from "Soyuzazot" do not cite them as proof of their "innocence" in their answer to the editorial office.

At the same time, according to the observations of the hydrometeorological service of the Verkhne-Volga administration that is also tracing the condition of the air and does not hide the results of its research from the public, in May in the Yasnaya Polyana region the exceeding of the maximum permissible ammonia gas concentration in the air at two points was 38-39% with the maximum concentration 1.9 mg/m^3 . Translated into simple language this means that the standard was exceeded 9.5-fold! Even a nonspecialist understands what consequences this can have for living nature.

The head of the department for protection of the Yasnaya Polyana landscaping, Yu. K. Fedorova, reported to the editorial office the data from the analyses of the hydrometeorological service for the summer months. They are not comforting. June was especially threatening for nature. At this time the ammonia gas in the air was 46-28% above the maximum permissible concentration, with a maximum concentration of 2.63 mg/m^3 , i.e., 13 times above the standard. In July it was 48-36%, 1.69 mg/m^3 , i.e., 8 times above the standard. In August it was 50-42%, 1.32 mg/m^3 , i.e., 6.5 times above the standard. This is "special attention!"

The letter of Comrade Lukashinskiy also states that no new construction of production facilities is planned at the Shchekino enterprise. Certain outdated plants are only being reconstructed and environmental protection questions are being solved at the same time. But does this correspond to reality? We will open, for example, the Shchekino rayon newspaper ZNAMYA KOMMUNIZMA of 5 September of this year. This issue covers the outlook for development of the chemical enterprise on a whole page. It turns out that by an order of the minister of the chemical industry, L. A. Kostandov of 1 April 1980, it is planned to conduct an experiment at the Shchekino association "Azot" which will cause a drastic increase in ammonia gas production, despite the governmental decisions that restrict such measures at this enterprise. Only this time the territory of the enterprise will not be expanded. Units of greater unit output will be installed. Everything is simple. The technical reequipping of the enterprise, which has already begun, will permit the collective of nitrogen workers to increase the product output by 35-40% in the next 5-10 years. Without building new shops the chemists are by-passing the governmental decision and increasing the power of the enterprise. This will be catastrophic for Yasnaya Polyana as a result. It is thus no accident that the Ministry of the Chemical Industry is silent. It is time for it to bear the responsibility for an unpatriotic attitude to Yasnaya Polyana.

9035

CSO: 1800

STATUS OF FLOOD CONTROL PROJECTS REPORTED

Athens I KATHIMERINI in Greek 26 Nov 80 p 8

[Article by Kaiti Doulveraki: "50 Billion for Long-Term Flood Control Projects in the Attiki Basin"]

[Text] For each large project in Athens and other large cities--let us forget the rest of the country since 70 percent of the population is concentrated in Athens and Salonica--there always comes up the obstacle of the infrastructure lack which is the cause of the increased cost of the project. In the case of the Attiki flood control project, the problem was mainly caused by the unprogrammed and careless expansion of its town planning complex through the arbitrary construction of buildings--a situation to which the state is now trying, in the face of accomplished facts, to give solutions often in an unorthodox way. Thus, even though the flood control works constructed from 1974 until now have been considered large, they nonetheless continue to remain disproportionately small for the existing needs.

It is known that the state has given priority to flood control protection projects and has appropriated large amounts for coping with the situation. But according to a statement by Public Works Minister Tzannetakis an additional amount of 40 to 50 billion drachmas will be needed while the time necessary for implementing the relevant program will be 8 to 10 years. In the meantime, what the ministry wants is to have the projects now in progress (for short-term needs) to be part of the overall program for long-term accommodation and not as "palliative" solutions. The ministry knows the problem and adopts measures within the framework of its possibilities, always giving priority to marginal areas.

It is noted that the network needed for controlling rain waters is estimated at 5,450 kilometers. The problem, however, will be solved to some extent by the 1,000-kilometer network being completed as a first phase.

Program Being Implemented

When he assumed the Public Works Ministry, Tzannetakis added to the program then in progress new projects which are expected to absorb 350 million drachmas in addition to the 650 million drachmas spent early in 1980 for the construction of another flood control protection program. Under this supplemental program, bids were awarded and new projects are being constructed in these areas: Korydallos, Nikais, Agios Ioannis Rendis, Keratsini, Khaidari, Aigaleo, Piraeus, Nea Smyrni,

Khalaniri, Nea Ionia, Agioi Anargyroi, Argyroupolis, and N. Irakleion. At the same time, preliminary work is being done for bids for new projects in N. Filadelfia, N. Ionia, N. Irakleion, Amarousi, Tavros, Moskhato, Viron, Ymittos, Kamatero, Zefyri, Akharnai, Peristeri, Ano Lysia, and the Athens municipality.

Projects

According to data provided by the ministry's Secretary General Ar. Tsiplakos, the Attiki basin sector covers an area of 590 square kilometers and is bound by the crests of the Parnis, Pendeli, and Ymittos Mountains. The urban area, the inhabited area, that is, covers 40 percent of the whole area with the result that the water absorbing factor of the soil is very small. The rest of the water must be channeled.

The natural outflow of the water is into Saronikos Bay through creeks which are its natural receptors. This outflow has been seriously disturbed, according to Tsiplakos, by careless construction activities especially in areas outside the city limits with the result that many of these natural receptors (creeks) have been eliminated to a large extent. He added that it is necessary to pay particular attention and to resist the senseless pressures of various social groups to fill in these creeks before the streets are properly laid out and before the necessary number of water collecting wells is constructed. He also said that from 1974 to 1979 creeks having a total length of 10,650 meters have been disposed of and rain water conduits 105 kilometers long were constructed.

These projects are: Kifissos River water outlet projects, 650 meters, coastal collectors, 2,500 meters, Podonifti, Nymfaios, Gianbourlas, Liosia, Pikrodafni, 7,500 meters.

During the same period basic collectors were constructed in: Moskhato, Kallithea, Nea Smyrni, 5,100 meters; Iera Odos, 2,000 meters; StHELONDON of Kalamaki, 1,000 meters; Kordelliou, Makedonia (Khalandri), 500 meters; Ioannina (Khalandri), 800 meters; Kalvos (Khalandri), 500 meters; and Kokkinaki (Akharnai), 1,200 meters.

Also creeks and streams 40,000 meters long were restored and widened at: Ikonion, Skhistos, Potamos (Korydallos), Amfiali, Khaidari, Liosia, Akharnai, Kifisos, Pyrna, Podoniftis, Pikrodafni, Kalogiroi, Agios Dimitrios, Trakhona, Paliron, Kanapitseris, Iafina, Pallini, Asopos, Zefyri, Eskhateia, and Skaramangas. Also 165 kilometers of conduits for rain waters were constructed in the areas of: Keratsini, Nikala, Korydallos, Agia Varvara, Aigaleo, Khaidari, Peristeri, N. Liosia, Petroupolis, Agioi Anargyroi, N. Filadelfia, N. Khalkidon, N. Ionia, Irakleion, Metamorfosis, Amarousi, Kifisia, Psykhiko, Filothei, Khalandri, Kholargos, N. Psykhiko, Galatsi, Agia Paraskevi, Zofrafos, Kaisariani, Viron, Ymittos, Agios Dimitrios, Dafni, Ilioupolis, Argyroupolis, Alimos, Moskhato, Kallithea, N. Smyrni, et al. Finally, besides the new water collecting wells, 2,000 more were added to the old water network.

A Proper Start

Reviewing the situation, Public Works Minister Tzannetakis said: "The New Democracy Party government could not solve in the past few years all the problems accumulated during the previous periods and especially those of the past 20 years with the

canceroid, improperly planned development of the city [Athens]. But it faced the the whole problem responsibly, wisely and realistically. First of all, it decided to prepare a general staff plan and study for coping with the flood control protection problem. The plan was prepared following international bids in which 81 firms recommended by the World Health Organisation participated. The British Watson Company was selected and prepared the staff plan with the assistance of the ministry's services.

"The plan includes all completed projects and it is expected that for solving the the problem the necessary projects will be programmed on a priority as well as a timetable basis. This means that each new construction is programmed on the basis of a timetable and within the extant economic possibilities. Thus, a solid foundation was laid, the whole project started well, and we believe that it can be completed in 7 to 10 years if the plans are followed.

"It is not possible to expect miracles and see the flash flood dangers disappear as if by magic through the projects thus far completed which represent only 10 percent of the total [scheduled]. No miracles can be performed. Only by continuing the projects can we limit the dangers and eliminate the frequency of flash floods until the whole program is completed. It should be pointed out that these projects have been planned so as to contain flash floods which recur in periods of less than 10 years in the case of basic water collectors and less than 50 years in the case of serious flash flooding."

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CSO:5000

UNHEALTHY SMOKE OVER ATHENS REPORTED

Athens ELEVTHERTOTYPIA in Greek 25 Nov 80 p 3

[Text] The yellowish-brown air-borne photochemical monster [cloud] again hovered in the sky over the capital yesterday. At some points, as a matter of fact, it descended to a height of only 200 meters above the ground even though the temperature was relatively low and despite the anticyclone which according to meteorologists foretells good weather conditions and can create some fog only in the morning.

The notorious cloud was full of classic pollutants: sulfur dioxide, floating particles, et al, but predominantly [it contained] nitrogen dioxide which according to the Athens Environment and Pollution Control Program [PERPA] has reached the disturbing count of 486 micrograms per cubic meter of air [mg/cma]--an inexplicable phenomenon at present. This [cloud appeared], moreover, at a time when the temperature fluctuated yesterday from 10 to 23 degrees Celsius, something which was not noticed during the previous appearances of the cloud. It usually appears when the temperature is low and there is humidity, no wind, and atmospheric inversion--the temperature, that is, rises as we go higher while normally the higher we go the lower the temperature. In a case such as yesterday's the pollutants are trapped and held at low atmospheric levels.

Unexplained Phenomenon

Since early yesterday morning a special PERPA crew has been making the rounds of all pollution control stations and taking samples. But as Spyropoulos [title not given] said, a period of 24 hours is needed before results can be obtained since these stations operate on a 24-hour basis.

"Indeed," [he said], "we cannot explain yesterday's phenomenon. In the center of Athens where hourly measurements were made for nitrogen dioxide it was found that this pollutant had increased. Its count from 0900 to 1400 hours fluctuated [as follows] in mg/cma: from 0900 to 1000: 217; from 1000 to 1100: 416; from 1100 to 1200: 486; from 1200 to 1300: 350; and from 1300 to 1400: 253."

Spyropoulos said that Greece accepts the California specifications which allow for a maximum acceptable nitrogen dioxide count of 470 mg/cma. But if this count is prolonged to more than 1 hour then problems develop. (Yesterday the critical period was from 1000 to 1200 noon.) He added that also the concentrations in sulfur dioxide, floating particles, and smoke were higher even though the exact count could not be determined since measurements are taken on a 24-hour basis.

These increased quantities, however, are visible--they appear in the form of spots in human organs. At any rate, they were much higher than on the 2 previous days. On Saturday, for instance, the average daily sulfur dioxide count was 160 mg/cma and on Sunday it dropped to 140. According to PERPA this may be due to the cold weather which necessitated the use of central heating systems.

For the first time perhaps, the figures cited by the Panhellenic Center of Ecological Research PAKOE agree with those of PERPA and the National Meteorological Service EMY. Yesterday's meteorological conditions were as follows:

- a. Lowest temperature just before sunrise 10 degrees and highest 23 degrees Celsius (EMY); 10 and 20 (PAKOE). According to EMY the winds were northeasterly at 3-4 knots (to be noticeable the wind speed should be 8-10 knots); according to PAKOE: winds at 4 knots.
- b. Humidity 62 percent (PERPA, PAKOE).
- c. Nitrogen dioxide: highest count 466 and lowest 253 mg/cma (PERPA). At 10 Sina Street the highest was 585 and the lowest 585 mg/cma (PAKOE).
- d. Smoke: densest and thinnest photometric units: 5.4 and 1.8, respectively (acceptable limit: 1 unit); floating particle count: 420 and 135 mg/cma maximum and minimum, respectively (regular: 100 mg), (PAKOE). At Rendis the measurements according to PAKOE were: nitrogen dioxide: 604 and 320 mg/cma highest and lowest count, respectively; smoke: 6 and 2.4 photometric units; floating particles, 520 and 300 mg/cma maximum and minimum, respectively; and sulfur dioxide, 220 maximum and 135 minimum mg/cma.

Yesterday's PAKOE press release states, in part, that:

- a. In such cases abroad schools are closed, traffic is limited to a few road arteries, industrial production drops and a general emergency is declared in the area. Unfortunately, nothing similar is done here and, above all, in the area of forecasts. We charge the government and especially the Ministry of Social Services of paying no attention at all to such a serious matter which affects public health. It should be noted that this is the twenty-fifth time the photochemical cloud has appeared since September 1979. Yesterday's cloud began to disappear during the early afternoon hours. Also, according to the PAKOE bulletin: "Information from outpatient clinics of the State, Tzaneio, and Chest Disease Hospitals shows that they have had many visits by people with respiratory problems."

At Sotiria Hospital

With regard to admissions for respiratory problems, Nikos Vasilopoulos, the doctor on duty at the Sotiria Respiratory Hospital, said yesterday at 2030 hours that indeed there were increased admissions of persons suffering mainly from chronic bronchitis and bronchial asthmas. Usually three to four such persons are admitted daily. Yesterday, there were seven admissions by 1915 hours.

"Inexplicably" Poisoned

The rest of the data concerning other polluting substances--sulfur dioxide, hydrocarbons, and so on, were not yet collected by late afternoon yesterday and therefore

the ministry service was not in a position to give out any information. However, the fear was expressed that these pollutants too must have increased since all signs pointed to such a conclusion.

The anti-pollution service reported another interesting point of information related to last Saturday. In the past 2 days a large concentration of sulfur dioxide was observed in contrast to what has been happening the past 2 days. Specifically, the measurements station at Patissia Street reported the following data for the weekend: 160 mg/cma of sulfur dioxide for Saturday and 140 mg for Sunday compared to 40 mg recorded until last week. Since only half of the automobiles are in circulation on weekends this phenomenon cannot be attributed to heavy traffic but only to the fact that many central heating systems were in operation because of the low temperatures. But such a large increase in sulfur dioxide as a result of the somewhat limited operation of the heating systems raises many questions for the appropriate authorities especially since, following the elimination of crude oil (mazut) from central heating systems, no such percentages of sulfur dioxide were recorded even during the coldest winter days when almost all heating systems ran for many hours. It suffices to note that when the heating systems used mazut the sulfur dioxide [in the atmosphere] did not exceed 120 mg [per cubic meter of air] and that this amount was reduced by half following the elimination of mazut. It should also be noted that during the same period in 1977 the maximum count of sulfur dioxide measured in Athens was 37 mg and the minimum 26 mg [per cma]. But regardless of any interpretations or explanations given for this large increase of pollutants in the Athens area in recent days, the fact remains that it is necessary to implement measures for the protection of the public as certain doctors pointed out when asked about it. The impact on health from the heavy pollution is serious and causes problems for many individuals.

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